

Software-Defined Ground Stations - Enhancing Multi-Mission Support, Phase I

Completed Technology Project (2008 - 2008)



Project Introduction

This SBIR Phase 1 proposal to NASA requests \$99,055.69 to enhance multiple mission support in ground stations through the use of software defined radios and virtual machines to create a software-defined ground station (SDGS). This proposal responds to NASA SBIR topic S4.09 "Autonomous Multi-Mission Virtual Ground and Spacecraft Operations". The significance of our SDGS work is that the monolithic, stovepipe, and hardware centric nature of ground stations will be reduced. Major system components will be moved to software, thereby promoting remote, network-based maintenance, upgrades, and new technology development. Off the shelf software modules will be available, but also mechanism for low-level ground station customization for mission specifics; all done remotely over the Internet. Costly hardware upgrades will be reduced or eliminated. Our innovation is in the intelligent combination of software-defined radio techniques and virtual machines. This enables a near complete software solution to primary ground station functions. It simplifies ground station hardware and enables flexible application support. In Phase 1 we propose to architect an SDGS system for support of expected small satellite missions. We will prototype basic elements with an on orbit or engineering model satellite system from our partners. Commercial applications include communication support for satellites and high altitude balloon systems. Our customers will include NASA, NSF, DoD, and private satellite builders such as universities and venture space. The PI, Dr. James Cutler, has extensive small satellite and ground station experience. He has prototype a global ground station network to operate satellites as if they were nodes on the Internet. Our facilities located in Northern California have tools for computer and radio development, and access to small satellite systems and ground station resources.



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Ames Research Center (ARC)

Responsible Program:

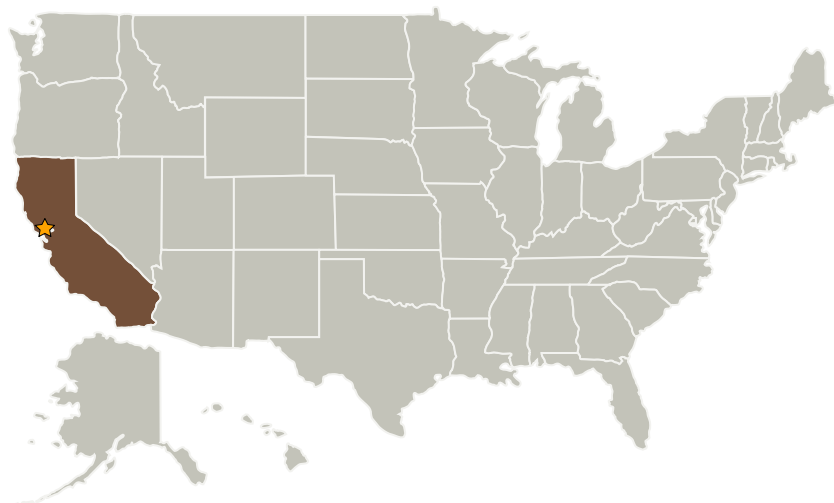
Small Business Innovation Research/Small Business Tech Transfer

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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★ Ames Research Center(ARC)	Lead Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations

California

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

James Cutler

Technology Areas

Primary:

- TX05 Communications, Navigation, and Orbital Debris Tracking and Characterization Systems
 - └ TX05.2 Radio Frequency
 - └ TX05.2.4 Flight and Ground Systems